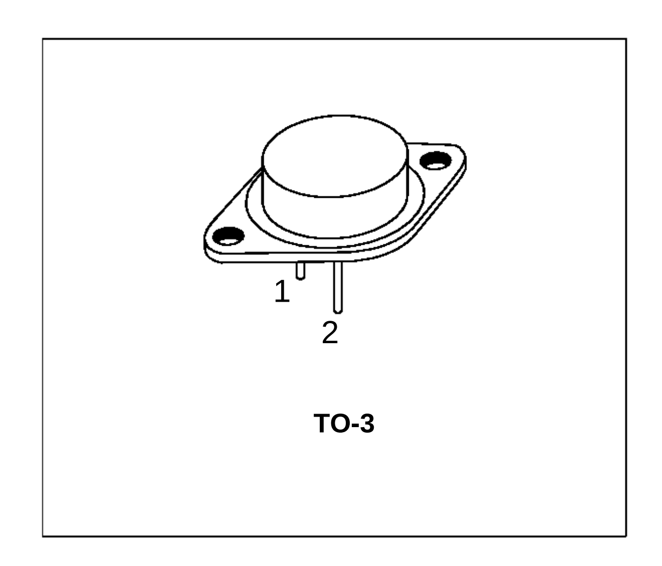
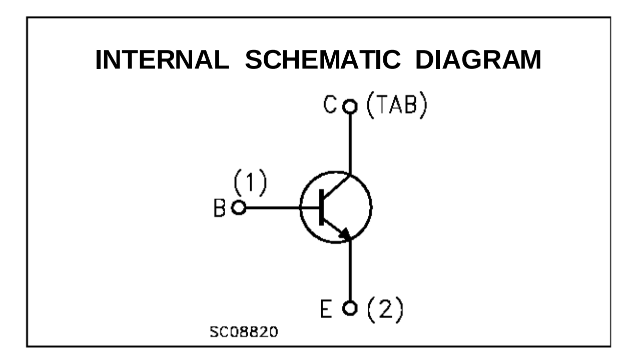
SGS-THOMSON MICROELECTRONICS

# BUV20/BUV21 BUV22

## HIGH CURRENT NPN SILICON TRANSISTOR




**DESCRIPTION**
The BUV20, BUV21 and BUV22 are silicon multiepitaxial planar NPN transistor in jedec TO-3 metal case, intended for use in switching and linear applications in military and industrial equipment.




**ABSOLUTE MAXIMUM RATINGS**

| Symbol | Parameter | Value | | | Unit |
|---|---|---|---|---|---|
| | | BUV20 | BUV21 | BUV22 | |
| $V_{CBO}$ | Collector-Base Voltage ($I_E$ = 0) | 160 | 250 | 300 | V |
| $V_{CER}$ | Collector-Emitter Voltage ($R_{BE}$ = 100Ω) | 150 | 240 | 290 | V |
| $V_{CEX}$ | Collector-Emitter Voltage ($V_{BE}$ = -1.5V) | 160 | 250 | 300 | V |
| $V_{CEO}$ | Collector-Emitter Voltage ($I_B$ = 0) | 125 | 200 | 250 | V |
| $V_{EBO}$ | Emitter-Base Voltage ($I_C$ = 0) | 7 | 7 | 7 | V |
| $I_C$ | Collector Current | 50 | 40 | 40 | A |
| $I_{CM}$ | Collector Peak Current | 60 | 50 | 50 | A |
| $I_B$ | Base Current | 10 | 8 | 8 | A |
| $P_{tot}$ | Total Power Dissipation at $T_{case} \leq 25\ ^oC$ | 250 | | | W |
| $T_{stg}$ | Storage Temperature | -65 to 200 | | | $^oC$ |
| $T_j$ | Junction Temperature | 200 | | | $^oC$ |

## THERMAL DATA

| | | | | |
|---|---|---|---|---|
| $R_{thj-case}$ | Thermal Resistance Junction-case | Max | 0.7 | $^{o}C/W$ |

## ELECTRICAL CHARACTERISTICS ($T_{case}$ = 25 $^{o}$C unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CEX}$ | Collector Cut-off Current ($V_{BE}$ = -1.5V) | $V_{CE}$ = $V_{CEX}$<br>for **BUV20**<br>for **BUV21**<br>for **BUV22**<br>at $T_{case}$ = 125 $^{o}$C<br>for **BUV20**<br>for **BUV21**<br>for **BUV22** | | | <br>3<br>3<br>3<br><br>12<br>12<br>12 | <br>mA<br>mA<br>mA<br><br>mA<br>mA<br>mA |
| $I_{CEO}$ | Collector Cut-off Current ($I_B$ = 0) | for **BUV20** $V_{CE}$ = 100 V<br>for **BUV21** $V_{CE}$ = 160 V<br>for **BUV22** $V_{CE}$ = 200 V | | | 3<br>3<br>3 | mA<br>mA<br>mA |
| $I_{EBO}$ | Emitter Cut-off Current ($I_C$ = 0) | $V_{EB}$ = 5 V | | | 1 | mA |
| $V_{CEO(sus)}$* | Collector-Emitter Sustaining Voltage ($I_B$ = 0) | $I_C$ = 200 mA L = 25 mH<br>for **BUV20**<br>for **BUV21**<br>for **BUV22** | <br>125<br>200<br>250 | | | <br>V<br>V<br>V |
| $V_{(BR)EB0}$* | Emitter-base Breakdown Voltage ($I_c$ = 0) | $I_E$ = 50 mA | 7 | | | V |
| $V_{CE(sat)}$* | Collector-Emitter Saturation Voltage | for **BUV20**<br>$I_C$ = 25 A $I_B$ = 2.5 A<br>$I_C$ = 50 A $I_B$ = 5 A<br>for **BUV21**<br>$I_C$ = 12 A $I_B$ = 1.2 A<br>$I_C$ = 25 A $I_B$ = 3 A<br>for **BUV22**<br>$I_C$ = 10 A $I_B$ = 1 A<br>$I_C$ = 20 A $I_B$ = 2.5 A | | <br>0.3<br>0.7<br><br>0.2<br>0.9<br><br>0.2<br>0.5 | <br>0.6<br>1.2<br><br>0.6<br>1.5<br><br>1<br>1.5 | <br>V<br>V<br><br>V<br>V<br><br>V<br>V |
| $V_{BE(sat)}$* | Base-Emitter Saturation Voltage | for **BUV20**<br>$I_C$ = 50 A $I_B$ = 5 A<br>for **BUV21**<br>$I_C$ = 25 A $I_B$ = 3 A<br>for **BUV22**<br>$I_C$ = 40 A $I_B$ = 4 A | | <br>1.4<br><br>1.2<br><br>1.2 | <br>2<br><br>1.5<br><br>1.5 | <br>V<br><br>V<br><br>V |
| $h_{FE}$* | DC Current Gain | for **BUV20**<br>$V_{CE}$ = 2 V $I_C$ = 25 A<br>$V_{CE}$ = 4 V $I_C$ = 50 A<br>for **BUV21**<br>$V_{CE}$ = 2 V $I_C$ = 12 A<br>$V_{CE}$ = 4 V $I_C$ = 25 A<br>for **BUV22**<br>$V_{CE}$ = 4 V $I_C$ = 10 A<br>$V_{CE}$ = 4 V $I_C$ = 20 A | <br>20<br>10<br><br>20<br>10<br><br>20<br>10 | | <br>60<br><br><br>60<br><br><br>60<br> | |
| $f_T$ | Transition frequency | $V_{CE}$ = 15 V $I_C$ = 2 A<br>f = 100 MHz | 8 | | | MHz |

∗ Pulsed: Pulse duration = 300 μs, duty cycle ≤ 2 %





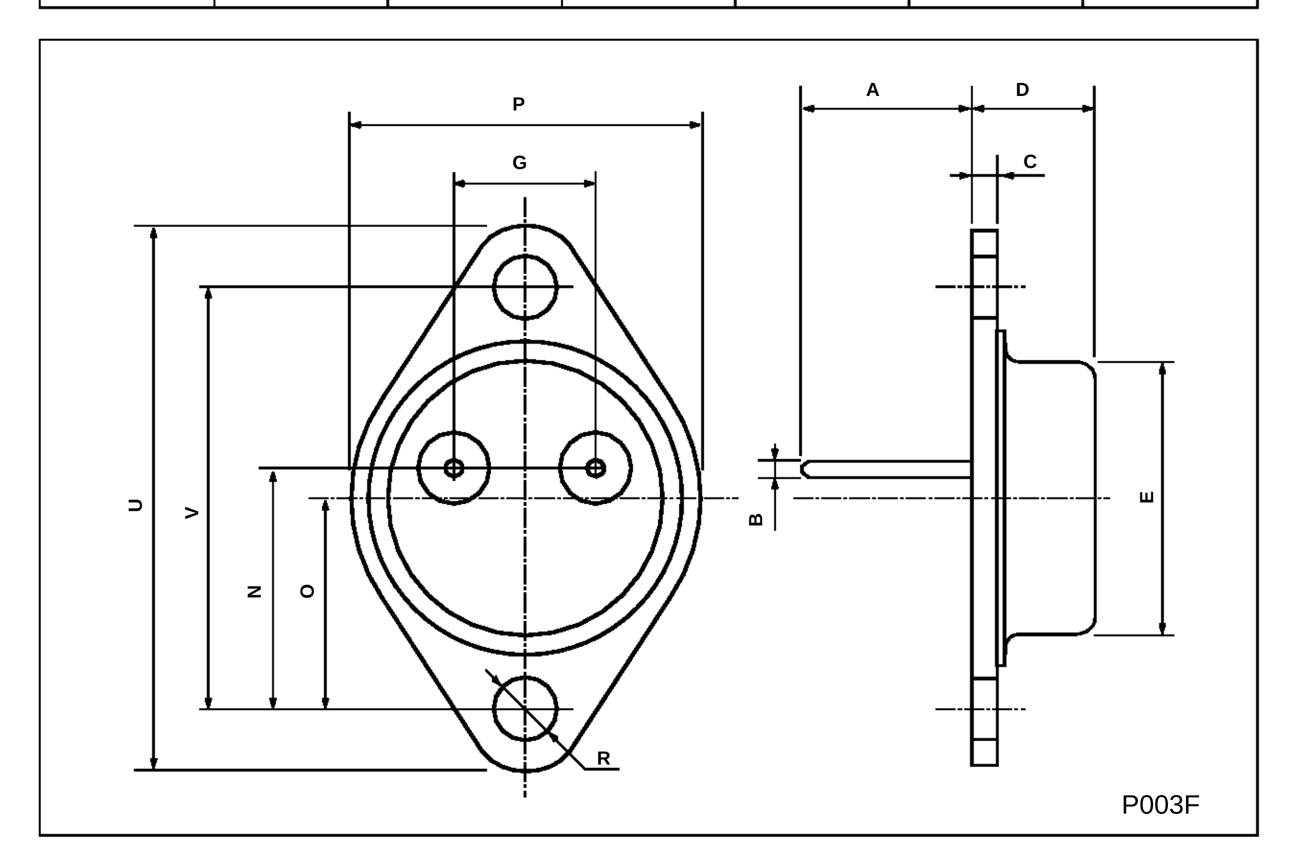
## ELECTRICAL CHARACTERISTICS (continued)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{on}$ | Turn-on Time | for **BUV20**<br>$I_C$ = 50 A $I_B$ = 5 A<br>for **BUV21**<br>$I_C$ = 25 A $I_B$ = 3 A<br>for **BUV22**<br>$I_C$ = 20 A $I_B$ = 2.5 A | | | 1.5<br>1.2<br>1.3 | μs<br>μs<br>μs |
| $t_f$ | Fall time | for **BUV20**<br>$I_C$ = 50 A $I_{B1}$ = - $I_{B2}$ = 5 A<br>for **BUV21**<br>$I_C$ = 25 A $I_{B1}$ = - $I_{B2}$ = 3 A<br>for **BUV22**<br>$I_C$ = 20 A $I_{B1}$ = - $I_{B2}$ = 2.5 A | | | 0.3<br>0.4<br>0.5 | μs<br>μs<br>μs |
| $t_S$ | Storage Time | for **BUV20**<br>$I_C$ = 50 A $I_{B1}$ = - $I_{B2}$ = 5 A<br>for **BUV21**<br>$I_C$ = 25 A $I_{B1}$ = - $I_{B2}$ = 3 A<br>for **BUV22**<br>$I_C$ = 20 A $I_{B1}$ = - $I_{B2}$ = 2.5 A | | | 1.2<br>1.8<br>2 | μs<br>μs<br>μs |

∗ Pulsed: Pulse duration = 300 μs, duty cycle ≤ 2 %

## TO-3 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 11.00 | | 13.10 | 0.433 | | 0.516 |
| B | 0.97 | | 1.15 | 0.038 | | 0.045 |
| C | 1.50 | | 1.65 | 0.059 | | 0.065 |
| D | 8.32 | | 8.92 | 0.327 | | 0.351 |
| E | 19.00 | | 20.00 | 0.748 | | 0.787 |
| G | 10.70 | | 11.10 | 0.421 | | 0.437 |
| N | 16.50 | | 17.20 | 0.649 | | 0.677 |
| P | 25.00 | | 26.00 | 0.984 | | 1.023 |
| R | 4.00 | | 4.09 | 0.157 | | 0.161 |
| U | 38.50 | | 39.30 | 1.515 | | 1.547 |
| V | 30.00 | | 30.30 | 1.187 | | 1.193 |




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